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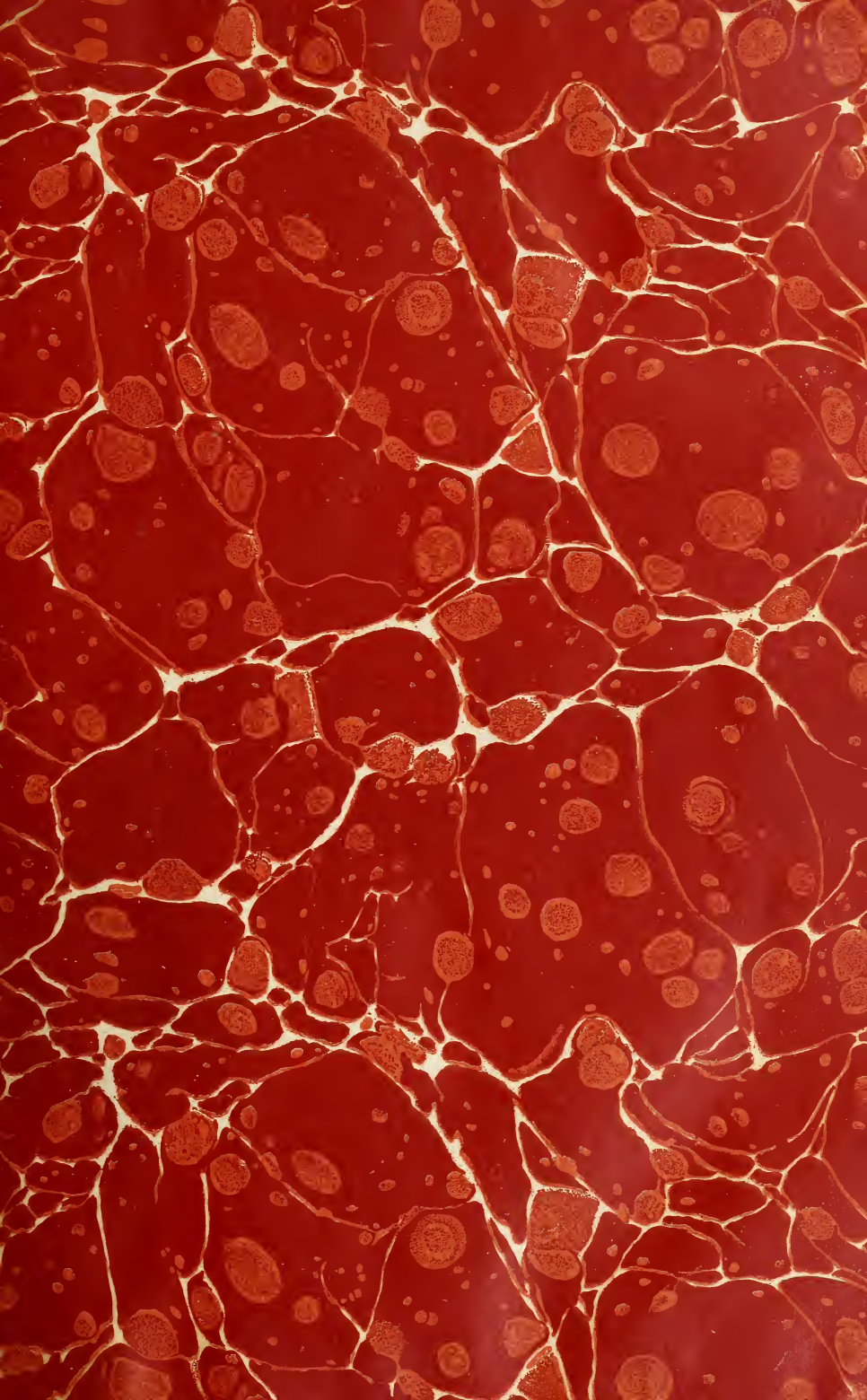
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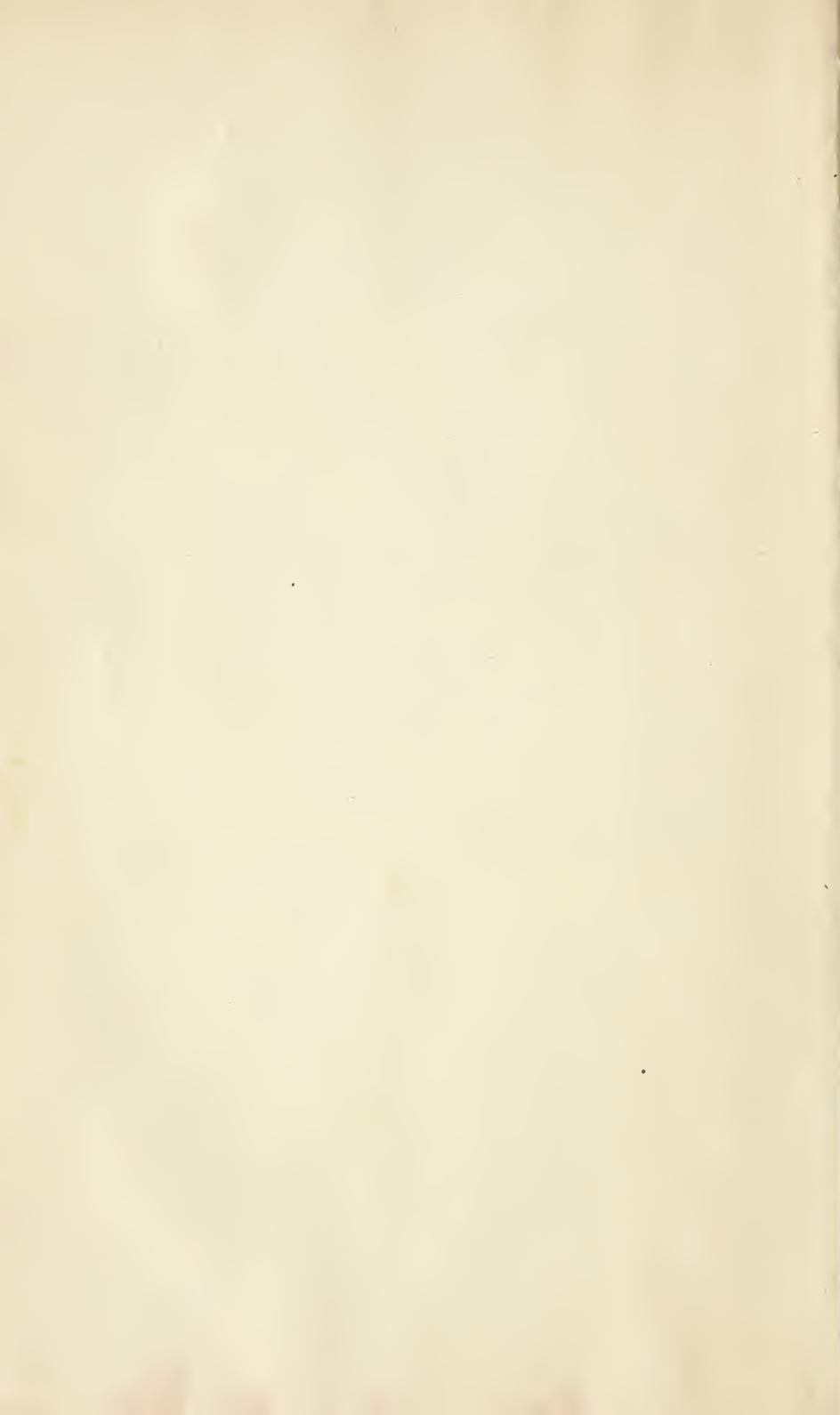
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UNITED STATES DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY—Circular No. 90.

# THE AGRICULTURAL SITUATION FOR 1918

A SERIES OF STATEMENTS PREPARED UNDER THE  
DIRECTION OF THE SECRETARY OF AGRICULTURE

## PART VII

# W H E A T

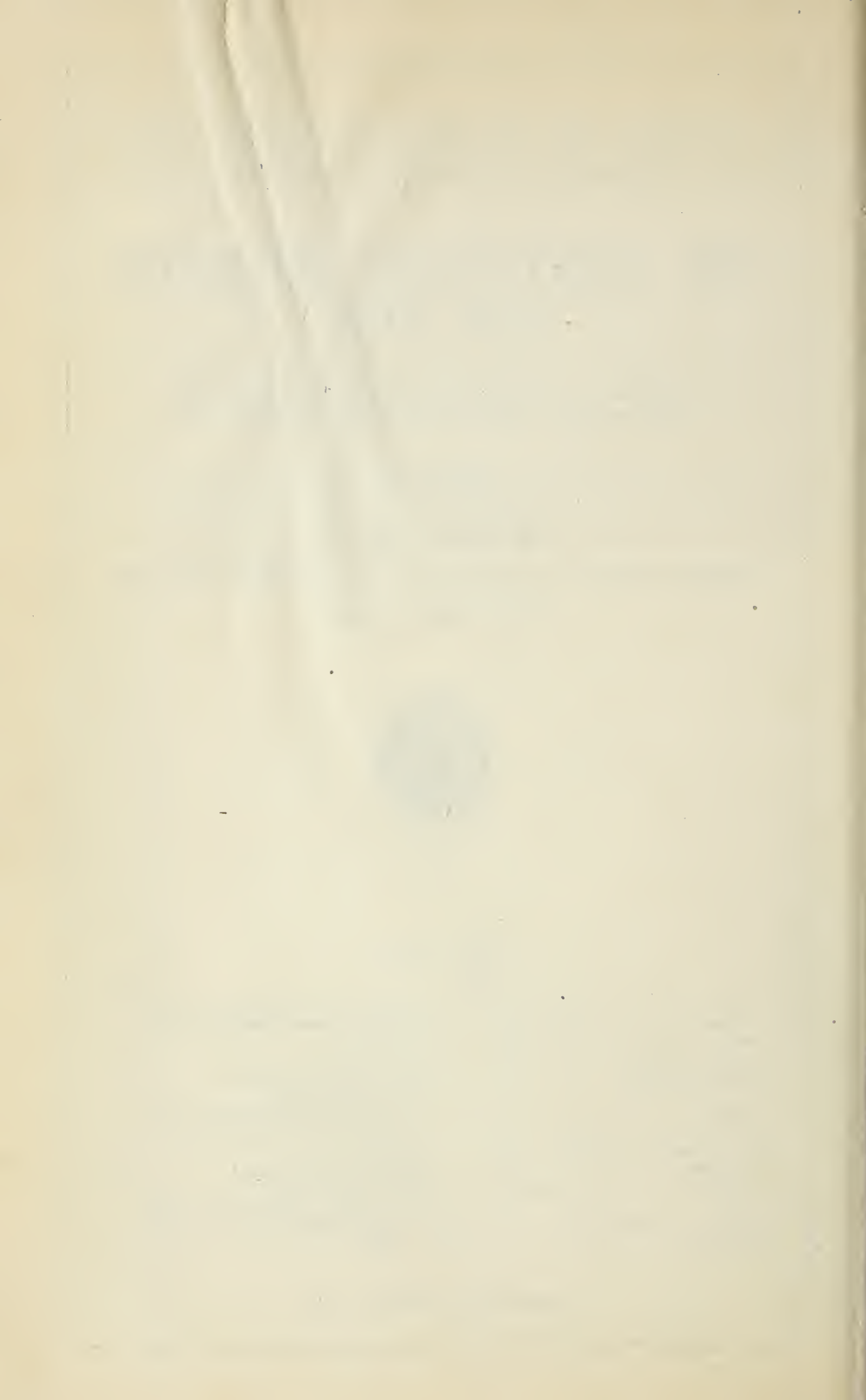
MORE WHEAT IS NEEDED FOR HOME USE AND  
FOR THE ALLIES



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WASHINGTON, MARCH 6, 1918.



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## WHY WE NEED MORE WHEAT AND SUBSTITUTES.

**F**OOD, funds, munitions, and men—these are prerequisites of war. Inability to supply any one of these immediately reduces the efficiency of a nation. Supplies of funds, munitions, and men all depend on and are controlled by the supply of food. It is, therefore, absolutely necessary to produce plenty of food in order to win the war. Last year the farmers of the Nation produced large crops in the aggregate, but the supply cannot be increased before another harvest. The substitution of other foods for those that are suitable for shipment abroad to feed our own soldiers and to piece out the Allies' scant supply is the duty of every citizen. Wheat is preeminently the food of armies. This grain in some form enters very largely into the rations of fighting men, because of the ease with which it can be transported and because of its excellent keeping qualities and high food value. It is important, then, that wheat be produced in large quantity and that it be carefully conserved and utilized.

## EFFECTS OF THE WAR UPON THE WORLD'S WHEAT PRODUCTION.

The war has weakened the producing power of the Allies. Large numbers of their strongest men have been withdrawn from the farms to bear arms; fertilizers and farm machinery have become scarce and expensive because of the use of the materials for war purposes; and armies have overrun and occupied large areas of the wheat lands of France and Italy. The effects upon the wheat acreage of these countries are shown in the following table:

TABLE 1.—*Wheat acreage in France, Italy, and the United Kingdom.*

[Thousands of acres; i. e., 000 omitted.]

Country.	Average, 1909-1913.	1917.	Decrease.	Increase.
France.....	16,160	10,439	5,721	
Italy.....	11,722	10,556	1,166	
United Kingdom.....	1,888	2,104		216
Total.....	29,770	23,099	1 6,671	

1 Net decrease.

Since the 1917 harvest the enemy has occupied some of Italy's wheat territory, thereby reducing still more her capacity for production this year. This reduction in acreage is not shown in Table 1. The United Kingdom, which normally has only a small wheat acreage, has succeeded by great efforts in increasing her acreage while carrying on the war.

Production has declined even more than the acreage of wheat in these countries, as shown in the following table:

TABLE 2.—*Production of wheat in France, Italy, and the United Kingdom.*

[Thousands of bushels; i. e., 000 omitted.]

Country.	Average, 1909-1913.	1917.	Decrease.	Increase.
France.....	318,000	144,000	174,000	
Italy.....	183,000	140,000	43,000	
United Kingdom.....	60,000	64,000		4,000
Total.....	561,000	348,000	1 213,000	

1 Net decrease.

Yields are affected greatly by the seasons, but undoubtedly scarcity of fertilizers and, owing to the scarcity of labor, less efficient cultivation have been important factors in lowering yields. In these countries the use of commercial fertilizers is a requisite for maintaining production. The war stopped the exportation of German potash fertilizer and very little is available outside of Germany and the countries allied with her. The cost of the transportation of materials, shortage of labor, and inability to get sulphuric acid, which is very essential in the manufacture of superphosphate and other dissolved manures have made it very difficult for farmers to secure any commercial fertilizers. In the United Kingdom sulphate of ammonia has taken the place of nitrate of soda, which is required for the manufacture of explosives, and since January 19, 1917, the exportation of sulphate of ammonia has been prohibited.



The colonial possessions and dependencies of the United Kingdom and France annually furnish them large quantities of breadstuffs. These countries also have been drawn upon for men and supplies, but at the same time have succeeded in increasing their wheat acreage, as shown in the following table.

TABLE 3.—*Wheat acreage in colonial possessions and dependencies of the United Kingdom and France.*

[Thousands of acres; i. e., 000 omitted.]

Country.	Average, 1909-10 to 1913-14.	<sup>1</sup> 1917-18.	Increase.	Decrease.
Canada.....	10,494	14,757	4,263	.....
India.....	29,217	33,039	3,822	.....
Australia.....	7,603	8,644	1,041	.....
Algeria.....	3,494	3,222	.....	272
Egypt.....	1,315	1,116	.....	199
Tunis.....	1,310	1,310	.....	.....
Total.....	53,433	62,088	<sup>2</sup> 8,655	.....

<sup>1</sup> Australia harvests part of its crops after January, 1918, and its crops are added to the crop harvested in the other countries in the fall of 1917.

<sup>2</sup> Net increase.

This increase in acreage has resulted from higher prices and patriotic appeals to the farmers. Canada and Australia have not only lost men by enlistment, but immigration has declined. In the year ending March 31, 1914, Canada received 384,000 immigrants but in the year ending March 31, 1916, received only 49,000. Immigration declined in Australia from 37,000 in 1913, to 1,000 in 1916. These countries produced in the five years preceding the war an average of 723 million bushels of wheat, and it is estimated that in this last year they have produced about 800 million bushels, an increase of over 76 millions.

TABLE 4.—*Wheat production in colonial possessions and dependencies of the United Kingdom and France.*

[Thousands of bushels; i. e., 000 omitted.]

Country.	Average, 1909-10 to 1913-14.	1917-18.	Increase.	Decrease.
Canada.....	204,708	231,730	27,022	.....
India.....	351,762	379,303	27,541	.....
Australia.....	90,499	122,880	32,381	.....
Algeria.....	34,998	28,979	.....	6,019
Egypt.....	34,814	29,835	.....	4,979
Tunis.....	6,224	6,963	739	.....
Total.....	723,005	799,690	<sup>1</sup> 76,685	.....

<sup>1</sup> Net increase.



The wheat producing power of the United States, Argentina, and Uruguay has also been affected by the war. Immigration has declined and many of the former immigrants have returned to fight for their home countries. At the same time in the United States, in particular, industries manufacturing war materials have drawn labor from the farms. Nevertheless these countries have increased the area sown to wheat since the war began.

The United States sowed in the fall of 1916 and spring of 1917 58,600,000 acres to wheat, which, excepting that sown for the crop of 1915, which was 61,173,000 acres, is the largest total wheat acreage ever sown in this country. The average acreages sown for the crops harvested 1911-15 was 54,685,000. Winter killing reduced the acreage of winter wheat to be harvested in 1917 to 27,430,000 acres, a loss of over 12 million acres. This made the total winter and spring wheat acreage harvested in 1917 about 45,941,000 acres. Both Argentina and Uruguay have this year harvested a considerably larger acreage than the average before the war.

TABLE 5.—*Wheat acreage in the United States and South American exporting countries.*

[Thousands of acres; i. e., 000 omitted.]

Country.	Average, 1909-10 <sup>1</sup> to 1913-14.	1917 and 1917 1-18.	Increase.	Decrease.
United States.....	47,095	45,941	.....	1,154
Argentina.....	16,052	17,581	1,529	.....
Uruguay.....	791	1,014	223	.....
Total.....	63,938	64,536	2 598	.....

<sup>1</sup> Argentina and Uruguay harvest from November to January and their crops are added to that harvested in the preceding summer months in the United States.

<sup>2</sup> Net increase.

TABLE 6.—*Wheat production in the United States and South American exporting countries.*

[Thousands of bushels; i. e., 000 omitted.]

Country.	Average, 1909-10 to 1913-14.	1917 and 1917 1-18.	Increase.	Decrease.
United States.....	686,692	650,828	.....	35,864
Argentina.....	147,069	2 239,000	91,931	.....
Uruguay.....	6,518	2 10,000	3,482	.....
Total.....	840,279	899,828	3 59,549	.....

<sup>1</sup> Argentina and Uruguay harvest from November to January and their crops are added to that harvested in the preceding summer months in the United States.

<sup>2</sup> Preliminary estimates.

<sup>3</sup> Net increase.

In these countries yields have kept pace with acreage except as they have been affected by the seasons. The United States harvested in 1917 less than the average crop before the war, but the crops of Argentina and Uruguay were more than 50 per cent better than the average.

### WHEAT DISTRIBUTION.

It was inevitable that war should cause a great change in the movement of wheat. Immediately after war was declared all nations involved and many of the neutral countries took drastic measures to secure and conserve their own supplies of breadstuffs. Indeed, prior to her entrance into the war the United States alone among the great producers did not restrict or direct the exports of wheat. Before the war the United Kingdom, Italy, France, and Belgium received large amounts of wheat from Russia and Roumania, and the neutral European countries also received large amounts from these two countries. Now all of these importing countries are compelled to look to other sources for their deficiencies in breadstuffs.

Before the war, 1910-1914, Germany imported wheat from Argentina, the United States, Canada, Australia, and India amounting to 45,000,000 bushels annually. The blockade of German ports caused this supply to be diverted to the neutral countries and the Entente Allies of western Europe, compensating to that extent for the loss of supplies from Russia and Roumania. In fact, it offsets the total loss in imports from Roumania.

The principal sources of supplies for the western European allies are Canada, the United States, Argentina, Australia, and India. Uruguay, Algeria, Egypt, and Tunis also furnish some wheat, but in small quantities. It is practically impossible to determine how the rate of wheat consumption has been affected by the war. The demand for bread has probably increased owing to the rise in price of other foods and the probable greater consumption of the men in the armies compared with men in civil life. On the other hand great efforts have been made to conserve bread as much as possible. Supposing the consumption remains the same as before the war, these surplus-producing countries are now called upon to export to the western European Allies, in addition to the usual amounts, sufficient to make up for the losses from imports from Russia, the losses from the decline in their production, and the losses from sinking wheat in transport.

The following table shows the average annual imports of the western European Allies before the war and each year since the war began, so far as the figures are available up to July 1, 1916. All of the figures on the imports of these countries since the unrestricted U-boat campaign began have not been made public.

TABLE 7.—*Net imports<sup>1</sup> of wheat, including wheat flour reduced to wheat, for the year beginning July 1 and ending June 30.*

[Thousands of bushels; i. e., 000 omitted.]

Country.	Average, 1909-1910 to 1913-1914.	1914-15.	1915-16.	1916-17.
United Kingdom.....	216,054	204,065	211,263	<sup>2</sup> 94,861
Italy.....	53,219	59,719	77,172	69,092
France.....	43,673	70,136	90,965	<sup>3</sup> 57,775
Total.....	312,946	333,920	379,400	.....

<sup>1</sup> Excess of imports over exports.<sup>2</sup> Net imports for 7 months only, July to January, 1917, inclusive.<sup>3</sup> Net imports for 6 months only, July to December, 1916, inclusive.

In the first two years of the war the imports of France more than doubled; those of the United Kingdom remained about steady, while imports into Italy increased nearly one-third. The total imports into all these countries increased 67 million bushels. (See Table 7.) The production of wheat in the Allied countries in 1917 was only 348 million bushels, which was 213 millions short of the average annual output before the war.

The neutral European countries are dependent upon the same sources for supplies as the western Allies. These countries have increased their production, but, excepting Spain, they produce little wheat and must import annually a considerable quantity. The war has increased somewhat the demands of the neutral countries for wheat, as has already been stated, by cutting off supplies of wheat from Russia and Roumania and also of rye from Germany and Russia, for which they now must import wheat, as the rye is not to be had from other sources.

TABLE 8.—*Net exports<sup>1</sup> of wheat, including wheat flour reduced to wheat.*

[Thousands of bushels; i. e., 000 omitted.]

Country.	Average, 1909-1910 to 1913-1914.	1914-15.	1915-16.	1916-17.
Canada.....	94,820	83,845	267,785	192,602
United States.....	106,934	311,036	233,056	178,654
Argentina.....	83,168	97,965	85,814	67,450
Australia.....	53,101	<sup>2</sup> .....	55,637	71,408
India.....	<sup>3</sup> 49,589	28,951	<sup>3</sup> 27,316	47,584
Total.....	387,612	521,797	669,608	557,698

<sup>1</sup> Excess of exports over imports.<sup>2</sup> In 1914-15 Australia imported 5,916,000 bushels of wheat.<sup>3</sup> Net exports April 1 to March 31, including government account.



The greater demand for wheat in Europe stimulated production in the exporting countries and at the same time led them to export a larger proportion of their crops, when possible. In the first year of the war, 1914-15, owing to a shortage in Canada and a failure of the wheat crop in Australia, the great bulk of the extra wheat for Europe had to come from the United States.

The United States had harvested a large crop in 1914, and, retaining less than usual, exported 311 million bushels, 200 millions more than the average before the war. In 1915 there were good crops everywhere, and all the exporting countries contributed to the supplies for the Allies and neutral countries for the following year. Last year, 1916-17, Argentina's crop was very short, which, together with the shortage of tonnage for moving the Australian crop, caused the burden to fall heavily upon the United States and Canada. These two countries also had short crops, but they exported a large share of their wheat, Canada over two-thirds and the United States nearly one-third of the total crop.

Owing to the great demands made upon the United States and Canada, stocks in these countries were greatly reduced at the end of the year 1916-17. The visible supply in Canada June 30, 1917, was estimated to be 20 million bushels, against 49 millions July 1, 1916, and in the United States 18 millions, against 49 million bushels on the earlier date. Owing to the shortage of tonnage for moving wheat from Australia a large stock has accumulated there from the crops of 1915 and 1916, but it is difficult to transport wheat from Australia because of the distance and the perilous route.

The situation at the beginning of this year, 1917-18, may be summarized as follows: The total production of the Allies and neutral countries, exclusive of Russia and Roumania, is 100 million bushels greater than in 1916-17, but stocks are low except in Australia. The Allied western European countries have produced 213 million bushels less than their average before the war, while the exporting countries which supply them their deficiencies harvested in 1917 only about 135 millions more than before the war.

Argentina, the United States, and Canada, the three countries which are in a position to export wheat most easily, harvested in 1917 150 million bushels more than last year. Before the war Argentina and Canada exported annually 178 million bushels out of an average production of 352 millions, leaving 174 millions for consumption. In 1917 these two countries harvested 470 million bushels, and, retaining their average annual consumption of 174 millions, can export 296 million bushels. If all of this amount were received by the Allies of western Europe, their supply would still be 230 millions short. But Brazil and other South American countries are depending upon Argen-

tina for supplies. Besides there are several neutral countries which must have some wheat from Argentina or other exporting countries. In order to supply the needs of the Allies the United States, Australia, and India would need to make up the 200 million bushels and in addition sufficient to make up the supplies to Brazil and neutral countries and sufficient to offset the sinkings by submarines. The long haul from Argentina and India with the shortage of shipping makes it imperative that the United States supply a large share of this deficiency.

### THE WHEAT SITUATION IN THE UNITED STATES.

A large share of the needs of the Entente Allies of western Europe must be met by exports from the United States. The estimated stocks on hand July 1, added to the estimated production of the year, give 699 million bushels to be distributed between July 1, 1917, and July 1, 1918. (See Table 9.)

TABLE 9.—*Production of wheat in the United States in 1917, supply on hand July 1, 1917, and possible distribution.*

	<i>Bushels</i>
Production in the United States, 1917.....	651,000,000
Supply on hand July 1, 1917.....	48,000,000
Total supply for the year 1917-18.....	699,000,000

Estimated distribution for year beginning July 1, 1917:

	<i>Bushels</i>
A. Consumption, normal rate (5.3 bushels per capita).....	549,000,000
Seed .....	87,000,000
To be on hand at end of year, July 1, 1918.....	40,000,000
Total retained .....	676,000,000
Surplus for export.....	23,000,000
B. Consumption, last year's rate (4.8 bushels per capita)...	497,000,000
Seed .....	87,000,000
To be on hand at end of year, July 1, 1918.....	40,000,000
Total retained .....	624,000,000
Surplus for export.....	75,000,000
C. Consumption, lowest rate in the States (4.0 bushels per capita) .....	414,000,000
Seed .....	87,000,000
To be on hand at end of year, July 1, 1918.....	40,000,000
Total retained .....	541,000,000
Surplus for export.....	158,000,000



The Bureau of Crop Estimates has estimated that the normal consumption in the United States is 5.3 bushels per capita. Estimating the population of the United States this year to be approximately 103,600,000, normal consumption would require 549 million bushels the seed requirements for this year are approximately 87 million bushels, and by leaving only very small stocks on hand July 1, 1918, there will be only 23 million bushels left for export. If we consume wheat at the rate computed for last year, 4.8 bushels per capita, or 0.5 bushel less than the normal rate, there will be approximately 75 million bushels for export. The investigations of the Bureau of Crop Estimates determined that the normal consumption of wheat in some of the Southern States, where little wheat is raised and the people eat much corn-bread, is only 4 bushels per capita. If the people of the entire United States will substitute corn and potatoes for wheat to the extent that some of the Southern States do, the per capita consumption may be lowered to 4 bushels, and then there will be 158 million bushels available for export. If the people of the South will make a corresponding reduction in the use of wheat, a still greater saving can be accomplished. Even this amount is considerably below what the United States has contributed to the Allies during the previous years of the war. Between July 1, 1917, and January 1, 1918, the United States has exported over and above the amount imported 44 million bushels of wheat and flour reduced to wheat.

TABLE 10.—*Net exports<sup>1</sup> of wheat and flour from the United States, July 1 to December 31, 1917.*

Month.	Wheat.	Flour reduced to grain.	Total.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
July.....	3,101,389	3,171,695	6,273,083
August.....	3,517,188	3,902,585	7,419,773
September.....	1,770,054	4,081,522	5,851,576
October.....	3,702,231	5,683,522	9,385,753
November.....	<sup>2</sup> —997,420	5,110,366	4,112,946
December.....	341,157	10,753,848	11,095,005
Total.....	11,434,599	32,703,538	44,138,136

<sup>1</sup> Excess of exports over imports.

<sup>2</sup> In November the United States imported 997,420 bushels more wheat than was exported.

The conclusion from the facts presented in regard to the situation in the United States and abroad is that (1) we must reduce our normal consumption of wheat; (2) we must increase production in 1918.

### THE CONSERVATION OF WHEAT.

The matter of conserving wheat to supply the needs of our own soldiers and the Allies of western Europe touches closely the food habits of the people. Cereals and other starchy foods, including wheat, corn, rice, rye, buckwheat, barley, oats, and potatoes, enter largely into our regular diet. In most parts of the United States wheat products constitute by far the largest part of the cereal and starchy foods. An investigation of the food consumption of 31 families in Washington in one week of May, 1917, showed that wheat bread and wheat flour constituted in weight nearly two-thirds (64 per cent) of this class of food. Potatoes were used by all families and made up one-fifth of this group of foods, while corn meal amounted to less than 10 per cent and was used by only 19 of the 31 families. Fortunately there are large crops of potatoes and corn this year, and the Food Administration is urging the people to use them more liberally for food in order to reduce the home consumption of wheat.

Rye is a bread grain of considerable importance in European countries. But bread made from rye flour has not been so acceptable to the American people as wheat bread, although there are indications now that the American people are turning more to the use of rye flour. Rye flour makes a nutritious, wholesome bread, somewhat heavier and darker than that from wheat flour, the color being due to the darker gluten it contains. Wheat and rye flour, of course, can be mixed in any proportion for baking. The United States harvested in 1917 60 million bushels of rye. However, since there is a good demand for rye bread and it may be exported as well as wheat, the only gain by the use of it as a substitute for wheat in this country is that farmers may be encouraged to grow more rye in the future to meet the increasing demand for it.

The wheat crop may be conserved by using it more completely for human food. Many countries have prohibited feeding wheat to animals. Changes have been made in the milling of wheat to increase the output of flour. In the United Kingdom mills are required to extract on an average 81 per cent, making a barrel of flour out of 242 pounds of wheat. In France the extraction now amounts to 81 to 85 per cent. In the United States it has been customary to make a barrel of flour out of 4½ bushels, 270 pounds. The Food Administration now requires mills to make a barrel of flour from 264 pounds of wheat, a saving of 6 pounds.

The mixing of other flours with the wheat flour is another measure for conserving the wheat supply. In the United Kingdom other flours must be mixed with wheat flour at the mill to the extent of 25 per cent. In France as much as 25 per cent of other flours may be mixed with the flour. The Food Administration asks the bakers in the United

States to mix other flours with our wheat flour to the extent of 20 per cent. This mixing of flours and increasing the percentage of flour milled will result in the saving of millions of bushels of wheat, or rather may enable the short wheat crops of 1917 more fully to supply the bread needs of the countries depending upon us until the 1918 harvest.

#### WAR MEASURES IN REGARD TO WHEAT PRODUCTION.

Special efforts to increase wheat production have been made by the governments of the countries engaged in the war. Laws have been passed in various countries enabling the State to compel the cultivation of land. Attempts have been made to encourage production in some cases by guaranteeing prices, in others by offering bounties and premiums. Beginning with the harvest of 1917 and until the requisitioning of wheat is at an end, France will pay a premium equivalent to about 16 cents per bushel for all wheat raised at home, and in addition in 1917 the equivalent of \$1.56 for every acre under wheat beyond the area cultivated on the farm in the previous year. She is now paying producers 50 francs per quintal, which equals \$2.63 per bushel for home-grown wheat. The Italian Government pays a premium equivalent to 36 cents per bushel for wheat grown upon soil brought into cultivation in 1917 and has furthermore granted the Ministry of Agriculture the equivalent of about \$38,000 for the encouragement of cereal cultivation. In order that the farmers of the United Kingdom may not hesitate to devote a larger area to wheat and to break up pasture land the Government has guaranteed a minimum price for home-grown wheat for the next six years. If the average weekly price from September 1 to March 31 is less than the price designated, the Board of Agriculture and Fisheries will make up the difference between the average price and the established minimum prices, which are as follows:

1917.....	60 shillings per quarter, or \$2.05 per bushel.
1918 and 1919.....	55 shillings per quarter, or 1.67 per bushel.
1920, 1921, 1922.....	45 shillings per quarter, or 1.37 per bushel.

During the first week in January, 1918, the United Kingdom paid home producers the equivalent of \$2.16 per bushel. Canada has fixed the price of No. 1 Northern Manitoba at \$2.21 per bushel, at Fort William. The Food Control Act of August 10, 1917, authorizes the President, upon a finding by him of an emergency requiring the stimulation of wheat production in the United States, to determine and fix guaranteed prices for wheat which will assure the producers thereof a reasonable profit. Thereupon the Government of the United States guarantees domestic producers who comply with the prescribed conditions that they shall receive for wheat produced by them in reliance



upon the guaranty a price not less than the guaranteed price determined by the President. The Act itself further guarantees absolutely, until May 1, 1919, that the prices for the several grades of wheat for the crop of 1918 shall be based upon No. 1 northern spring or its equivalent at not less than \$2 per bushel at the principal interior primary markets.

On February 21, 1918, the President issued a proclamation guaranteeing the price of wheat for the 1918 harvest at the principal primary markets, which are 25 in number. The prices range from \$2 per bushel in Salt Lake City, Utah, Great Falls, Montana, Spokane, Washington, and Pocatello, Idaho, to \$2.28 per bushel in New York City, and with some adjustments correspond with the basic prices fixed for government purchase for 1917. (See page 31). A part of the President's statement is as follows:

"This guaranteed price assures the farmer of a reasonable profit even if the war should end within the year and the large stores of grain in those sections of the world that are now cut off from transportation should again come into competition with his products. To increase the price of wheat above the present figure, or to agitate any increase of price, would have the effect of very seriously hampering the large operations of the Nation and of the Allies by causing the wheat of last year's crop to be withheld from the market. It would, moreover, dislocate all the present wage levels that have been established after much anxious discussion and would, therefore, create an industrial unrest which would be harmful to every industry in the country.

#### KNOWS FARMERS ARE LOYAL.

"I know the spirit of our farmers and have not the least doubt as to the loyalty with which they will accept the present decision. The fall wheat planting, which furnishes two-thirds of our wheat production, took place with no other assurance than this, and the farmers' confidence was demonstrated by the fact that they planted an acreage larger than the record of any preceding year, larger by 2,000,000 acres than the second largest record year, and 7,000,000 acres more than the average for the five years before the outbreak of the European war.

"It seems not to be generally understood why wheat is picked out for price determination, and only wheat, among the cereals. The answer is that, while normal distribution of all our farm products has been subject to great disturbances during the last three years because of war conditions, only two important commodities, namely, wheat and sugar, have been so seriously affected as to require governmental intervention. The disturbances which affect these products (and others in less degree) arise from the fact that all of the over-seas

shipping in the world is now under Government control and that the Government is obliged to assign tonnage to each commodity that enters into commercial over-seas traffic. It has, consequently, been necessary to establish single agencies for the purchase of the food supplies which must go abroad. The purchase of wheat in the United States for foreign use is of so great volume in comparison with the available domestic supply that the price of wheat has been materially disturbed, and it became necessary, in order to protect both the producer and the consumer, to prevent speculation. It was necessary, therefore, for the Government to exercise a measure of direct supervision and as far as possible to control purchase of wheat and the processes of its exportation. This supervision necessarily amounted to price-fixing, and I, therefore, thought it fair and wise that there should be a price stated that should be at once liberal and equitable."

#### THE WINTER WHEAT ACREAGE AND CONDITION.

The United States Department of Agriculture made a direct appeal to farmers last fall to increase their winter wheat acreage. A committee of Department officers and experts studied the food problem in consultation with specialists in the several States and recommended acreage to be sown in the several States amounting to 47,337,000 acres in the United States. The conditions in some of the States made it impossible to realize the increases asked. A big corn crop maturing late was one obstacle to sowing a large acreage of winter wheat. Where corn was not cut it was difficult to increase the acreage sown to winter wheat except as it was possible by seeding last year's wheat and oats stubble. In some parts of the corn belt wheat was sown in standing corn. The drought in the fall in the Southwest and in the western parts of Kansas and Nebraska and in Montana and Washington was responsible for a reduced acreage in these regions. In the face of all these obstacles farmers sowed last fall 42,170,000 acres, nearly 2 millions more than in 1916 and 5 millions more than the five-year average, 1911-1915. However, the fall wheat went into the winter season in the lowest condition ever recorded. On December 1, 1917, the reports to the Bureau of Crop Estimates indicated the condition to be 79.3 per cent, against 89.3 per cent as a 10-year average, and 85.7 per cent on December 1, 1916. A quantitative forecast is not usually made from the December condition reports, because great changes can occur between them and harvest, for better or worse, but it may be observed that in the last 10 years the yield per acre on the planted acreage was 14.4 bushels, and on this basis a condition of 79.3 would forecast a yield of about 12.8 bushels. This on 42,170,000 acres would produce about 540,000,000 bushels. The midwinter snows may improve this condition.



The farmers of the country nearly doubled the percentage of increase in the acreage devoted to winter rye which was suggested in the program recommended by the United States Department of Agriculture and the State institutions working in cooperation with the farmers. This program called for 21.8 per cent increase, whereas 36.6 per cent more than in 1916 was actually sown, according to the December 1 forecast made by the Bureau of Crop Estimates. The acreage was increased in every State, but the very large increase in the total is due to the sowing of 120 per cent more in North Dakota and 35 per cent more in South Dakota. In fact, the acreage sown was the largest ever devoted to the crop, being 6,119,000 acres, compared with 4,480,000 acres in 1916.

The condition of the rye crop on December 1 throughout the country, however, was only 81.1 per cent, compared with 92.2 per cent for the 10-year average and 88.8 per cent on December 1, 1916. Taking into consideration the acreage of winter rye, 6,119,000 acres, and the condition of 84.1 per cent, a 1918 yield of approximately 85,000,000 bushels was forecasted on December 1, 1917. Even with the low condition reported, the acreage is sufficient to promise a yield of rye fully equal to that which the United States Department of Agriculture and the State agencies had estimated conservatively as an average yield from the 5,131,000 acres recommended to be planted in 1917.

#### ACREAGE OF SPRING WHEAT.

The failure to secure a very substantial increase in the acreage of winter wheat makes it imperative that, if possible, we sow a much larger acreage of spring wheat in order to make certain that we shall have an adequate supply of wheat for our own uses and to meet the needs of the Allies. In February the Department of Agriculture announced a program which re-emphasized and amplified the food-production program for 1918 issued by the Department in August, 1917, and other suggestions made in the fall and the first of the year regarding increased pork production and increased production of foodstuffs in the South. (See Circular No. 103, Agricultural Production for 1918.) Taken in connection with the recommendations previously made, it suggests in full the proposals which the Department thinks it desirable to offer with a view to secure enough meat and dairy products, cereals, sugar, and other staple and perishable foods, wool, and cotton for the Nation, its armies, and the Allies. It gives suggestions for the approaching spring operations, based upon the latest available information as to the condition of the fall-planted crops of winter wheat and rye and as to the number of meat and dairy animals reported for 1917. They represent the best thought of the specialists of the Department, who have had the benefit of advice from agricultural leaders throughout the country.

In dealing with the question of spring wheat, the program stated:

"While the area of winter wheat sown in 1917 was the largest on record, the condition of the crop, as reported on December 1, was the lowest ever recorded, indicating a probable production of only 540,000,000 bushels. Whether the actual production will be greater or less than the estimate will depend upon conditions prevailing between now and the time of harvest.

"If there were planted to spring wheat in the United States this year an acreage equal to the sum of the record planting in each spring wheat State within the last 10 years, there would be sown approximately 23,300,000 acres. If there should be planted an acreage equal to the sum of the record planting for each State within the last five years, there would be sown approximately 21,000,000 acres. The record planting for any year was 20,381,000, in 1911. The acreage for 1917 was 18,511,000.

"The Department of Agriculture has carefully studied all of these records and other data in connection with the present war conditions and needs, and believes that it will be possible this year to secure an acreage in excess of the record acreage which was planted in 1911. It is believed that increased acreage can be secured in States and sections where spring-wheat production is known to be reasonably promising, and that such increases can be made without upsetting farm plans. The total acreage will be greatly influenced by what is done in Minnesota, North Dakota, Montana, and Idaho, where the conditions have not been the most favorable, and where in some sections they have been decidedly unfavorable during the past two years. North Dakota's lowest acreage in the last five years was that of 1917—7,000,000; Minnesota's, 3,230,000 in 1917; Montana's, 390,000 in 1913; and Idaho's, 200,000 in 1913. North Dakota's record acreage in the last five years was 8,350,000 in 1915; Minnesota's, 4,150,000 in 1913; Montana's, 1,122,000 in 1917; and Idaho's, 375,000 in 1917. North Dakota's five-year average (1912-1916) was 7,657,000; Minnesota's, 3,995,000; Montana's, 566,000; and Idaho's, 231,000. Montana's annual planting has shown increases during the last four years as follows: 1914-15, 321,000; 1915-16, 185,000; 1916-17, 187,000. What these States can do this spring it is difficult to determine, and will be controlled by local conditions. Because of the difficulties which they have experienced, particularly during the past two years, a definite suggestion of acreage for these four States is not given in the accompanying table. However, the average acreage of each for five years (1912-1916) is included. These are great spring wheat producing States and they may be counted upon to do all they can. If it is possible for them to extend their acreage the total for the last column will be correspondingly greater.

TABLE 11.—Spring wheat acreage suggested for 1918, compared with earlier years.

State or Territory.	Largest acreage, 10 years, 1908-1917.		Largest acreage, 5 years, 1913-1917.		Acreage, 1917.	† Acreage suggested for 1918.
	Year.	Acres.	Year.	Acres.		
Maine .....	1917	11,000	1917	11,000	11,000	20,000
Vermont .....	1917	3,000	1917	3,000	3,000	5,000
New York .....	....	.....	....	.....	.....	40,000
Pennsylvania .....	....	.....	....	.....	.....	10,000
Maryland .....	....	.....	....	.....	.....	2,000
West Virginia .....	....	.....	....	.....	.....	10,000
Ohio .....	....	.....	....	.....	.....	50,000
Indiana .....	....	.....	....	.....	.....	50,000
Illinois .....	....	.....	....	.....	.....	100,000
Michigan .....	....	.....	....	.....	.....	50,000
Wisconsin .....	1917	146,000	1917	146,000	146,000	500,000
Minnesota .....	1908	5,356,000	1913	4,150,000	3,230,000	*3,955,000
Iowa .....	1911	360,000	1913	345,000	250,000	750,000
North Dakota .....	1911	9,150,000	1915	8,350,000	7,000,000	*7,657,000
South Dakota .....	1911	3,700,000	1913	3,675,000	3,596,000	3,596,000
Nebraska .....	1917	400,000	1917	400,000	400,000	700,000
Kansas .....	1908	200,000	1914	60,000	44,000	50,000
Montana .....	1917	1,122,000	1917	1,122,000	1,122,000	*566,000
Wyoming .....	1917	123,000	1917	123,000	123,000	175,000
Colorado .....	1908	293,000	1917	264,000	264,000	325,000
New Mexico .....	1917	69,000	1917	69,000	69,000	80,000
Arizona .....	1908	15,000	....	.....	.....	.....
Utah .....	1908	170,000	1917	90,000	90,000	125,000
Nevada .....	1917	37,000	1917	37,000	37,000	50,000
Idaho .....	1917	375,000	1917	375,000	375,000	*231,000
Washington .....	1917	1,350,000	1917	1,350,000	1,350,000	1,700,000
Oregon .....	1917	401,000	1917	401,000	401,000	300,000
California .....	....	.....	....	.....	.....	5,000
United States .....	.....	23,281,000	.....	20,971,000	18,511,000	†21,142,000

† This should be interpreted in the light of the preceding text.  
\* Five year average.



"The accompanying table shows the record planting in each State within the last 10 years, within the last 5 years, and the acreage planted in 1917, in all the States producing considerable quantities of spring wheat.

"It is hoped that many farmers, especially in the northern part of the corn belt, will find it possible to plant five or ten acres additional in wheat. In some cases they will plant more. In a number of States in the eastern and central portion of the country where spring wheat has not been grown in recent years, the crop is now being re-established and it is recommended that this movement be encouraged to a moderate extent, and possibly even up to the area that was profitably grown only a few years ago.

"It is believed that to a small extent the acreage in oats, if necessary, could be reduced in the interest of wheat, even though this may mean somewhat less of oats to be fed to live stock, leaving the animals more dependent upon other grains and roughage. Likewise, a very small portion of the acreage which normally would be planted to corn in the northern part of the corn belt might be sown to spring wheat. It is well known to good feeders of live stock that some adjustment can be made along these lines without serious, if any, detriment to their feeding operations.

"If the acreage of spring wheat indicated for some of the States cannot be planted, the acreage of barley, which is known to grow better in some localities, might be increased. The use of barley is increasing in this country and it is a welcome food in Europe.

"The maximum production of wheat will be aided by a wider adoption of certain well-known practices. These include especially the thorough preparation of the seed bed, the selection of the best seed obtainable, and the treatment of seed where necessary to protect it against disease. To reduce losses in the Far West resulting from dust explosions in thrashing machines, specialists are being stationed at various points throughout that region to aid manufacturers and operators of these machines to apply the devices and methods which the Department, in cooperation with certain State colleges, has found to be completely effective in preventing these fires. Similar work is under way to eliminate dust explosions in grain elevators and warehouses."

To secure a large production of spring wheat it is important not only to have a large acreage sown but to have it sown in season. The wheat should be sown as early as possible after the danger of freezing is past. Early-sown wheat has the best chance to escape rusts, scab, and drought. Yields in the spring wheat region have been shown to depend largely upon the temperature of June. When June is cool, cooler than the average, the yields are higher than the average; that is, the yields are best when the wheat has made a fairly good growth

before the warm summer weather begins. Farmers in the Northwest plow as much land as possible in the fall in order that they may have as much as possible prepared for early seeding. Last fall in some places the October cold weather interfered somewhat with plowing, and in some parts the land was too dry during most of the fall season. The snows that covered the ground during the winter will supply moisture for the spring, and farmers should prepare for early spring plowing on a large scale.

### FARM LABOR.

It is very difficult in the foreign belligerent countries to secure labor to cultivate and harvest the crops, since the men most capable of doing such work are nearly all in the army. In some countries the labor of women, girls, and boys has been requisitioned. Prisoners of war and interned aliens have been employed in agriculture and many mobilized men have been periodically placed at the disposal of directors of agriculture in busy seasons. The governments of both the United Kingdom and France have provided aid for farmers wishing to purchase or secure the use of tractors and other farm machinery. The cantons of Switzerland are empowered by the Federal Council to requisition labor and agricultural machinery.

Regarding the labor situation in the United States, the following discussion is published in Circular No. 103, Agricultural Production for 1918:

"In farming, as in other industries, there are labor difficulties to be overcome. The welfare not only of farmers themselves, but also of the Nation, depends upon the determination of the farmers, with the assistance of Federal and State agencies and other organizations, to surmount these difficulties. The Department has stationed in nearly every State of the Union a farm labor specialist who will cooperate with the Department of Labor and with appropriate State agencies in dealing with the problem. The men will do everything in their power to enable the farmers of the Nation to secure the requisite supply of labor for their operations, especially during the planting and harvesting seasons. The most promising lines of approach in dealing with the matter seem to be the following:

- (1) A systematic survey of the farm labor situation in order to ascertain the needs of the farmers and to determine ways of meeting them. The Department through its agents stationed in various States, and in cooperation with The Department of Labor and The State councils of defense and other State agencies, is now making such a survey.

- (2) The promotion of fuller cooperation in the utilization of labor among farmers in the same community.



(3) The further development of agencies for assisting in the transfer of labor from sections where the seasonal pressure has passed to sections where additional help is urgently needed.

(4) Making available additional labor which heretofore has not been fully or regularly utilized in farming operations, including boys of high school age who have had experience on the farm.

(5) The largest possible production and fullest use of labor-saving machinery.

"The releasing of men for agricultural purposes, by replacing them with women in the lighter industrial tasks so far as possible, and by diverting labor from relatively non-essential enterprises, are matters which demand serious consideration.

"It should be borne in mind that some of the disturbing factors of last year in the farm labor situation have been eliminated, and therefore the problem, in some respects, may not be quite so acute this year. Naturally, the disturbances are much more violent immediately after a great shock has been given the industrial system. This Nation has been organized on a peace basis. When it entered the war it was necessary not only to create vast additional facilities and machinery, but also to provide on an enormous scale for the operation of the new establishments and of those previously existing. Many shipyards had to be expanded and others had to be created. Large cantonments had to be built, and built quickly. Furthermore, it was necessary to have an army, and this necessarily caused additional labor drains and dislocations. In the haste of the first draft it was impossible to work out a satisfactory classification of labor with reference to the National needs.

"The Army cantonments and many of the aviation fields and camps have now been completed and will not have to be duplicated. A part of the industrial expansion for war purposes also has been accomplished. The regulations promulgated by the War Department provide a system of classification of the men subject to the draft which contemplates the placing of skilled farm labor engaged in necessary agricultural enterprises in class 2, assistant or associate managers of necessary agricultural enterprises in class 3, and heads of necessary agricultural enterprises in class 4. The Secretary of War has asked Congress for authority to furlough soldiers of the National Army, whenever the interests of the service or the National security and defense render it necessary or desirable, during harvest and planting time, to enable them to assist in the agricultural production of the country. It is reasonable to suppose, in view of these facts, that some of the difficulties previously encountered will be removed or minimized. It must be recognized, however, that the situation will continue to be difficult and that a satisfactory solution

will require the best thought of the Nation and the fullest and most complete cooperation of all agencies."

In some cases the farmer might easily grow more wheat simply by changing from other agricultural industries to wheat growing, but this as a rule is not desirable. Other products also are needed. There is greater need than ever before to economize human labor. All unnecessary operations should be eliminated and machinery should be employed wherever possible to save human labor. Larger machines may be operated by one man. Four-horse teams may often replace two-horse teams, one man doing nearly twice as much work as before. In the Northwest six-horse teams are frequently seen and some men work two teams, driving one and leading one. Labor may be economized by cooperation among farmers. In many cases where farmers usually grow only a small acreage of wheat, which is all they can seed or harvest, they could easily grow more by cooperating with other farmers in buying or hiring larger machinery for seeding and harvesting. The one way to economize labor which is possible to every farmer is to prepare to do all work in the proper season.

#### **IMPORTANT PRACTICES IN WHEAT GROWING.**

Certain fundamental facts concerning crop production which are based upon sound agricultural practices become all the more important at this time, when every grain of wheat sown should be made to produce the maximum at harvest. These practices are important not only to maintain our production this year, but to keep up the production in succeeding years. Subjects deserving special consideration are selection of proper soils, fertilizers, the rotation of crops, the selection and preparation of the seed for sowing, the seeding of the wheat, and pests and diseases.

#### **SELECTION OF SOILS ADAPTED TO WHEAT.**

It is especially important at this time, when we are extending wheat cultivation to new regions and expanding its culture to untried parts of farms, to give attention to soil requirements. The sowing of seed on unadapted and unproductive land, wastes not only seed but labor, and reduces the total harvest accordingly. Ordinarily it is an inexcusable form of waste, and at this time should be reduced to the minimum. The soil best suited to the production of wheat is one which furnishes a firm yet friable seed bed beneath which there is a compact subsoil. It should have sufficient natural slope to allow good surface drainage and should be provided with subsoil drainage. This soil furthermore should contain plenty of vegetable matter and plant food and should not be acid.

These conditions are most nearly fulfilled in the loam, silt-loam, clay-loam, and some of the clay soils. Sandy soils and many heavy clay soils are not so suitable for wheat growing, the former being too loose in texture to retain moisture and the latter too compact to allow aeration and proper drainage. A silt loam overlying clay is a good combination. Rye should be sown on the light soils.

### FERTILIZERS.

Fertilizers are commonly used only in the eastern half of the United States. The best fertilizer to build up the land in preparation for wheat is 5 or 6 tons per acre of barnyard manure, to each ton of which 40 to 50 pounds of acid phosphate or rock phosphate (floats) is added before spreading. It is advisable, but not necessary, to apply the manure to a preceding cultivated crop, such as potatoes or corn. If in preparing for wheat too much manure is added to rich soil a heavy growth of straw and consequent lodging may result. If green manure, such as cowpeas or clover, is plowed under, 200 to 250 pounds of acid phosphate should be added per acre.

The war conditions have increased the cost of fertilizers and reduced the supply. Shipping conditions have made their transportation difficult. Congress has made provision for Government purchase and sale of nitrate of soda at cost.<sup>1</sup> It is not generally desirable, however, for those who are not accustomed to the use of fertilizers to begin to use them at this time, unless they have made a careful study of methods or will use them under the direction of experts. Much waste may result from their ill-advised use, and those who must have them to produce a crop may be deprived of them.

### CROP ROTATIONS.

It is not advisable to crop wheat continuously on the same land, as such a practice results in depleted soil fertility, exhausted soil moisture in dry sections, poor physical condition of the soil, increased growth of weeds, and lowered yields of poorer quality. Even if soil fertility and a fairly good physical condition are maintained by the addition of chemicals, such a cropping system is inadvisable, because of its cost and the other effects referred to.

In the drier sections of the West, where the crop rotations of the eastern States are not possible, the fallow system is employed in wheat growing, the land remaining idle one year in two or three. If the fallow land has been cultivated and kept free from weeds, it is the best land upon which to grow wheat. Wherever possible, wheat should

<sup>1</sup> Methods of Sale of Nitrate of Soda to Farmers by the United States Government, Circular 78, United States Department of Agriculture.



be sown after some other crop than wheat, preferably a cultivated one. Wheat yields almost as well in the Northwest on land that has been in corn or peas the previous year as on the clean-fallowed land. A rotation of grain crops only is little better than continuous wheat, as no nitrogen-adding crop is included and humus is likely to be exhausted.

#### PREPARATION OF THE SEED.

The selection of seed may play an important part in increasing the crops. It is usually advisable to use home-grown wheat for seed, as it has been shown by experiments that seed acclimated to a locality gives better yields than seed of the same variety brought from a distance. The practice of changing seed each year or every few years is not justified by experimental results. Any change that is made should be for the purpose of establishing a better variety of known value. A new variety should be tested on small plots in a locality in order to establish its value and allow for acclimatization before it is generally sown. Every farmer, however, should get good seed, the best to be had in his community, which would mean an additional bushel or even more per acre and costs no more labor.

Broken, immature, weevil-eaten, and shriveled grains, weed seeds, and all foreign material should be removed by fanning and grading the seed before it is sown. The fanning mill will also remove smut balls and many grains affected by scab, as these are lighter than the sound grain. There should be at least one mill in each community. If individuals find the cost too high, several farmers may find it desirable to own a mill in common.

#### SEED MADE AVAILABLE.

It is, of course, necessary that spring wheat and spring rye seed be saved over the winter for planting the following spring. In order that quantities of grain suitable for seed might be saved, the United States Food Administration modified its regulations which restrict to 30 days the storage of wheat and rye for commercial purposes. This modification of the license under which grain dealers are working was made in the manner and upon the terms and conditions following:

(1) That the proprietor shall have the right (1) to select such lots and parcels of wheat and rye as he may deem suitable for seed and to retain same on storage in said elevator on his own behalf for resale for bona fide use as seed at the next sowing time, and (2) to retain on storage in said elevator stocks of customer's wheat and rye selected for their own use as seed or for resale for bona fide use as seed at the next sowing time.

(2) That the proprietor shall not sell any of the said selected seed wheat at a greater advance than fifteen per cent (15%) in excess of the price at said



elevator at time of purchase for Number 1 wheat, based upon the price being paid at the nearest terminal by the Food Administration Grain Corporation.

(3) That in storing and distributing such wheat and rye stocks selected for seed, the proprietor will cooperate with the Committee on Seed Stocks of the United States Department of Agriculture.

(4) That as soon as any wheat or rye is retained or stored, pursuant to Article First hereof, the proprietor shall show the amounts and kinds of such wheats and rye selected and stored for seed, together with details as to ownership of each lot, as separate items under "Seed Wheat Stocks" and "Seed Rye Stocks" in each weekly report to the United States Food Administration.

(5) That the United States Food Administration shall have the right to terminate the modifications of said license regulations specified herein at any time upon giving notice of such termination to the proprietor.

In connection with this modification all those wishing to take advantage of these modified terms of storage were instructed that "All lots of wheat which are to be held for seed should be examined and approved by the United States Department of Agriculture." Directions for the selection of these lots and the taking of samples for examination by the Department were submitted. The samples are being examined by the Department Seed Reporting Service, and those submitting them are notified whether or not their storage is approved. The following suggestions were made to those submitting samples for seed:

*Select best quality seed.*—The greatest care should be exercised in the choice of stocks for seed purposes; only plump and clean wheat should be saved, or, at least, stock that can be put into the best condition by recleaning.

*Keep varieties separate.*—Mixtures of varieties are very undesirable for sowing. Pure seed of a single variety is most desirable. Varieties should be kept separate, and not more than one variety should be stored in a bin. In no case should two or more lots of wheat of entirely different class or type be mixed for seed purposes.

*Save only seed free from smut.*—No wheat saved for seed purposes should show trace of the presence of smut, before or after cleaning.

*Reclean seed.*—Wheat as it comes from the thrashing machine is rarely suitable for sowing. It is very desirable to have seed free from all impurities. The thorough cleaning of all seed grain is recommended.

*Sample carefully every lot.*—In order to determine the value of any lot of wheat for seed it is necessary to have a *representative sample*. The utmost care should be taken in securing this sample according to the instructions on reverse side of this letter. Send samples securely wrapped (a cloth bag is best) and plainly labeled or tagged, to U. S. Seed Reporting Service. Be sure to supply all information requested on the back of tag.

It is believed that the grain dealers of the country will extend to the Food Administration and to the Department of Agriculture the heartiest cooperation in their efforts to conserve an ample supply of the best quality seed for next season's crop.

## PRINCIPAL PESTS OF THE WHEAT CROP AND STEPS TAKEN TO CONTROL THEM.

### HESSIAN FLY.

The Hessian fly is a destructive pest of the wheat crop in the eastern and central parts of the country. Its attacks are confined almost entirely to winter wheat, but in recent years it has also attacked spring wheat in some sections, more particularly where spring wheat as well as winter wheat is grown. Where this insect is present it is advisable to take precautionary measures to prevent injury by it. No extensive attacks were reported in 1917. It is always advisable to have in mind the possibility of such attacks, however, and to employ the methods of farming best calculated to combat them. The greatest objection to the most practicable and effective method of controlling this pest in the field—namely, late sowing—is the danger of so delaying the growth of the plants that they do not become sufficiently advanced to enable them to withstand the winter. The ill effects of late sowing can be largely avoided by good farming practices. Aside from late sowing, the methods of controlling the Hessian fly are identical with the methods producing the maximum yields of wheat. It is entirely possible for the farmer to fight the Hessian fly by the process of good farming, involving early plowing, thorough cultivation, good seed, a rotation of crops, and the application of fertilizers containing readily available plant food.

### INSECTS INJURIOUS TO STORED GRAIN.

Stored grain is frequently very seriously damaged by the angoumois grain moth and the black weevil. In the present emergency it is more important than ever before that such losses be prevented as far as possible. These insects may be destroyed in grain stored in bins or barrels by the use of liquid carbon disulphid.

Place the grain in air-tight bins holding from 30 to 40 bushels. Place 1 pound of carbon disulphid in a shallow vessel on top of the grain and cover the top of the bin as tightly as possible. The liquid readily vaporizes, and the fumes, being heavier than air, pass down through the grain, destroying all insects. This method is most effective when the temperature is about 75 degrees F. Grain stored in concrete storage bins of the modern elevator is safe from insect attack.

### DISEASES.

#### SMUTS.

Statistics indicate that the annual loss caused by preventable smuts in the United States amounts to 20 million bushels of wheat and 1½ million bushels of rye. In order to reduce these losses as much as

possible a campaign has been carried on by the Department in co-operation with the Extension Service in the several States in which cereal crop production is an important source of income, since September, 1917. This was made possible by an appropriation in the Food Production Act, passed by Congress in the preceding August.

About 40 men, trained in agronomy and plant pathology, were appointed for this work, being assigned to duty first in the Northern States. After planting was completed in these States they were moved southward and similar work continued. Their work is largely in co-operation with the county agents, and consists of conducting seed treatment demonstrations at county and state fairs, before farmers' organizations, and on individual farms. Some of the men are offering instruction as a part of the agricultural course in certain movable schools, and in county and township high schools where these exist. It is thought that the work of these men will result in the lessening of the damage due to these diseases, and that if the campaign can be carried on for two years the amount of loss from smut can be reduced from 65 to 75 per cent.

In the Pacific Northwest the problem of smut control is more difficult and chemical treatment must be supplemented by crop rotation and seeding at earlier dates.

The smuts are common diseases of wheat. There are two of them, the stinking smut, or bunt, and the loose smut. They can be distinguished easily, since the stinking smut has a distinct, disagreeable odor which can be recognized in the thrashed grain, while the loose smut does not have such an odor. The stinking smut when present forms smut balls, consisting of a compact mass of dark-brown spores within a thin, gray membrane. When these smut balls are crushed, only a dark-colored, dust-like material remains. In heads affected by loose smut the kernels are entirely destroyed, and there is left in the field just before harvest the rachis or central stem of the head.

The stinking smut of wheat can be controlled by treatment with chemicals. A simple method is to treat the seed with a solution of 1 pint of formalin to 40 gallons of water. While one person shovels and mixes the grain another should sprinkle it with the solution, using about one gallon to the bushel of grain. After the grain is thoroughly moistened it should be put into a pile and covered with blankets or sacks for several hours, after which it should be spread out to dry.

The losses from ergot in rye are rather heavy, amounting sometimes to as much as 3 per cent. Since ergotized rye is poisonous to stock, special care should be taken to eliminate this disease. The ergot grains can be floated off in a salt solution, according to a method recently devised. The use of ergot-free seed and crop rotation are effective in controlling the disease.



## RUST.

The disease most injurious to wheat and the factor that limits yields in many sections of the country more than any other is rust. This affects both stems and leaves, orange or brown and black pustules forming on these parts. Its development is favored by dampness and heat. It is most destructive on low, damp land. Early ripening varieties will generally be less affected than late varieties. Sowing on fertile, well-drained uplands and the use of early varieties are the most successful methods of combating the disease. Seed treatments are not effective in preventing rust.

Some progress has been made recently in the development by breeding of varieties of wheat resistant to rust. One variety developed in Kansas, and known as "Kanred," shows a remarkable resistance to stem rust, which is the most destructive rust in this country. This variety is being grown on a number of farms in Kansas and neighboring States. It has been demonstrated that it will outyield ordinary varieties, and for this reason is of considerable importance in the way of securing an increased production of wheat. Unfortunately, however, the supply of seed is sufficient for only a fraction of one per cent of the wheat crop, so that the increased yields will be of small importance in 1918.

In certain European countries the eradication of the barberry bush has resulted in a large reduction in the severity and frequency of stem rust epidemics. With this in mind, during the last few years, the Department has been conducting a careful survey throughout the wheat-growing regions to determine the relationship of the common barberry to rust epidemics. The results of these studies show clearly that throughout the spring-wheat region the common barberry is perhaps the chief agency in the perpetuation of stem or black rust epidemics.

The importance of eradicating barberry from the spring-wheat areas of the United States has been especially called to the attention of the governors of the States interested in the production of spring wheat, and special agents of the Department will immediately undertake in each of these States, in cooperation with State representatives, a vigorous campaign to point out the relationship of the common barberry to the prevalence of severe rust epidemics, and to secure the cooperation of farmers and others throughout this entire area to eliminate this menace to wheat production by the complete eradication of the common barberry from this region both in city, town, and country.

## WHEAT AND RYE COMPARED.

In any consideration of the expansion of the acreage of bread grains in certain parts of the country, it is necessary to consider wheat and



rye together. This is because rye can be planted safely on many fields with less risk than wheat. Further, rye can be used as a substitute for wheat as a bread grain by those who are accustomed to it. Rye succeeds on poorer soils and with less fertilizer and in colder climates than wheat, and for these reasons should be planted in preference to wheat where it has proved a safer crop. The farmer, who, because of an attractive price for wheat, may be tempted to plant wheat rather than rye in a locality where rye is the more certain crop, takes a speculative risk of loss through winter killing and destructive wheat diseases which is unwarranted.

Rye will grow on some lands not adapted to wheat. Sandy, exposed, poor, improperly prepared, or acid land will usually yield better crops of rye than of wheat. On large areas of sandy land rye can usually be grown to better advantage than wheat. As rye uses less nitrogen, it can be grown on poorer lands. Rye should be sown on newly-cleared timberland and drained marshland, as it is more resistant than wheat to the acid condition of the soil which is likely to exist.

Rye may be sown later in the fall than wheat. If the land cannot be prepared in time for wheat, owing to rush of work, seasonal conditions, or because some late-maturing crop is occupying the land, rye may well be sown. Rye will germinate more quickly than wheat and at a lower temperature. It will germinate and grow with the temperature but a few degrees above freezing, when wheat would be practically at a standstill. It can be sown after late-maturing crops are removed, thus furnishing a winter cover and allowing a grain crop to be grown. Since it can be sown late, it distributes labor on farms where wheat is grown, as the wheat can all be sown before rye sowing is begun.

Rye uses less nitrogen, pound for pound of crop produced, than wheat, the amount in rye being about four-fifths that in wheat. It also requires less lime in a soil for good crops. It can, therefore, be grown on poorer lands, can be produced with less fertilizer, and does not exhaust the supply of nitrogen so much as wheat for the same amount of crop.

Rye should be sown more generally on the sandy lands along the Great Lakes in Michigan, Illinois, Indiana, Ohio, and New York, and in New Jersey. Rye should also take the place of many of the old pasture and hay lands of New York, Pennsylvania, and the New England States. Rye is a safer crop than winter wheat for such lands. Pennsylvania has much land more suitable for rye than for wheat.

It is estimated that in 1916 there was sown in the cotton belt about 100,000 acres of rye. It seems advisable to increase this acreage very greatly in the future. In parts of the cotton belt a choice can be made between rye and winter oats for sowing, especially on sandy lands. Rye has an important advantage over oats in that it is more winter-hardy.

The states in the corn belt also can enlarge considerably their rye acreage over that usually sown, as the lighter soils and many acid soils which are not especially well adapted for wheat could be planted to advantage to rye.

The culture of the rye crop does not differ materially from that of the wheat crop. Rye may replace wheat if such a change is desired in almost any section of the country.

### USES OF THE RYE CROP.

#### RYE FOR BREAD.

Rye flour makes a nutritious, wholesome bread, somewhat heavier and darker than that from wheat flour, the color probably being due to the darker gluten it contains. The dough from rye flour often becomes too soft and falls or becomes soggy. To correct this, one-fourth to one-half the quantity of wheat flour is often added. The addition of the wheat flour improves the color and palatability of the bread as well as the working qualities of the dough, rye flour being very sticky and difficult to handle. Wheat and rye flour can, of course, be mixed in any proportion for baking.

#### RYE GRAIN AS A FEED.

As a feed for hogs, rye grain fed in combination with skimmed milk has about the same value as barley grain so fed. Neither is as good for fattening as corn, but the quality of pork produced is better. Rye shorts is not a satisfactory hog feed. Rye may be fed to work horses from 2 to 4 pounds daily in addition to other grain. Ground rye or rye bran may be fed to milch cows, not more than 3 pounds being used daily.

#### RYE AS A COVER, GREEN-MANURE, AND GRAZING CROP.

Rye alone or with hairy vetch or crimson, bur, or red clover, depending on the locality, is frequently sown with good results as a cover or grazing crop. The crop should be sown early, in order to produce a large amount of fall and winter pasture and to allow a good growth before plowing. Rye is the best grain to use for this purpose.

When grown as a cover and green-manure crop rye should be plowed under at or before the time it is knee high. If allowed to make more growth, it may exhaust the soil moisture and decay slowly in the soil.

Rye being grown for grain will furnish much fall and winter pasture. In this case it should not be pastured too closely or when the ground is wet.

# THE CONTROL OF WHEAT BY THE FOOD ADMINISTRATION AND FAIR PRICE FOR WHEAT.

On account of the unusual and disturbed conditions existing in the domestic and international trade in wheat, the Food Administration, under authority given it by Congress, has required all elevators and mills of 75 barrels daily capacity to take out a government license and to comply with certain conditions as to profits and storage, and to make reports to the Administration. The Food Administration opened agencies for the purchase of all wheat at the principal terminals, carrying on its transactions with the usual dealers. These transactions on the part of the Food Administration are carried out by the Grain Corporation. After wheat is bought it is resold for export and to millers for domestic consumption. The Administration makes no charge except a nominal percentage to cover costs of the operation.

Inasmuch as under these arrangements the Food Administration has a large influence in affecting the price of wheat, the President approved the appointment of a committee, the members of which represent both producers and consumers. This committee, after mature consideration, fixed the price for government purchases of \$2.20 for No. 1 Northern wheat of the 1917 crop, or its equivalent, at Chicago, with differentials between grades and classes of wheat at the different primary markets of the United States. The President, by proclamation, on February 21, 1918, guaranteed the prices for the 1918 harvest would be the same as for the 1917 harvest, with some adjustments arising from the designation of additional primary markets. The grades and prices are given in Table 12.

TABLE 12.—*Prices of wheat at interior primary markets for 1917.*

[No. 1 hard winter, No. 1 red winter, basic grades, equivalent of No. 1 northern spring.]

	Government Price.		Government Price.
No. 1, dark hard winter.....	\$2.24	No. 1, durum, basic .....	\$2.20
No. 1, hard winter, basic.....	2.20	No. 1, durum red .....	2.13
No. 1, red winter, basic.....	2.20	No. 1, red walla .....	2.13
No. 1, yellow hard winter.....	2.16	No. 1, hard white basic.....	2.20
No. 1, soft red winter.....	2.18	No. 1, soft white .....	2.18
No. 1, dark northern spring....	2.24	No. 1, white club .....	2.16
No. 1, northern spring, basic...	2.20	No. 2 of grade, 3 cents less	
No. 1, red spring .....	2.18	No. 3 of grade, 6 cents less.	
No. 1, humpback .....	2.10	No. 4 of grade, 10 cents less.	
No. 1, amber durum .....	2.24		

## RELATIVE MARKET BASIS FOR 1917.

Kansas City, 5 cents less; Omaha, 5 cents less; Duluth, 3 cents less; Minneapolis, 3 cents less; St. Louis, 2 cents less; Chicago, basis; New Orleans, basis; Galveston, basis; Buffalo, 5 cents more; Baltimore, 9 cents more; Philadelphia, 9 cents more; New York, 10 cents more.

## RELATIVE MARKET BASIS FOR THE PRICES GUARANTEED FOR THE 1918 HARVEST.

To date, (March 4), the market differentials for the different grades of wheat have not been established for the harvest of 1918. However, the price per bushel guaranteed for the harvest of 1918 on No. 1 Northern spring wheat and its equivalent has been fixed by the President at the principal primary markets as follows:

Chicago, Ill.....	\$2.20	Seattle, Wash.....	\$2.05
Omaha, Neb.....	2.15	San Francisco, Calif.....	2.10
Kansas City, Mo.....	2.15	Los Angeles, Calif.....	2.10
St. Louis, Mo.....	2.18	Galveston, Tex.....	2.20
Minneapolis, Minn.....	2.17	New Orleans, La.....	2.20
Duluth, Minn.....	2.17	Salt Lake City, Utah.....	2.00
New York, N. Y.....	2.28	Great Falls, Mont.....	2.00
Philadelphia, Pa.....	2.27	Spokane, Wash.....	2.00
Baltimore, Md.....	2.27	Pocatello, Idaho.....	2.00
Newport News, Va.....	2.27	Fort Worth, Tex.....	2.09
Charleston, S. C.....	2.27	Oklahoma City, Okla.....	2.05
Savannah, Ga.....	2.27	Wichita, Kans.....	2.08
Portland, Oreg.....	2.05		





